

# INSTRUCTION MANUAL

## MODEL 2075

0.75 METER SCANNING  
MONOCHROMATOR

Serial Number

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**McPHERSON™**

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## SUPPLEMENTAL INSTRUCTIONS FOR MODEL 2075

This Model 2075 has been modified to meet customers special requirements including dual snap-in grating turret, entrance periscopes, electrically controlled exit shutter, and two position tiltable filter assembly.

The dual snap-in grating turret is controlled either through the optical interface controller or through the labview software provided. Snap-In gratings having a 110 x 110mm blank size can be used and are installed as described in the standard Model 2075 Instruction Manual.

Indexing of the dual grating turret must only be done through the optical interface controller and should not be indexed by hand, where as, the special indexing gear will be out of phase with the holder.

Each grating holder of the dual turret is labeled for identification, that is, A & B which matches the grating identification displayed on the optical interface controller.

Since there are variations in the wavefront (flatness) of the best available plane gratings, a focus trimming adjustment may be required. A micrometer located externally to the instrument housing is provided for ensuring optimum performance when interchanging gratings. Micrometer settings for the gratings supplied are listed in table provided at the end of this supplement.

Two entrance slit sighting periscopes are provided to view the back of the entrance slits. Each periscope can be raised or lowered by loosening the white nylon thumb screw.

**CAUTION: THE PERISCOPE THAT VIEWS THE END MOUNTED SLIT CAN ONLY BE LOWERED OR RAISED WHEN THE ENTRANCE 45° MIRROR ASSEMBLY IS OUT OF THE OPTICAL PATH OF THE INSTRUMENT.**

**THE PERISCOPE THAT VIEWS THE SIDE MOUNTED SLIT CAN ONLY BE LOWERED OR RAISED WHEN THE ENTRANCE 45° MIRROR ASSEMBLY IS IN THE OPTICAL PATH OF THE INSTRUMENT.**

An electric shutter is provided in the exit slit housing of the monochromator. This shutter remains closed unless activated by the optical interface controller or through the labview software provided.

A two position tiltable filter assembly contains two holographic filters (514.5nm and 488.0nm) and has provisions for coupling a fiber optics input.

The filters are indexed into the optical beam by pushing the black knob for the specific filter, (514.5 or 488.0), all the ways in until the black knob contacts the housing. An index line on the knob indicates the approximate angle (tilt) of the filter. Each graduation represents approximately 5°. The zero "0" reading is when the filter face is approximately perpendicular to the input beam.



### FOCUS TRIMMING ADJUSTMENT TABLE

Since there are variations in the wavefront (flatness) of the best available plane gratings, a focus trimming adjustment may be required. This will ensure optimum performance when interchanging gratings in a high resolution spectrometer.

The Model 2075 is factory aligned and focus adjusted with a master grating having minimum wavefront error. The focussing mirror is positioned by a micrometer setting of .300 with the master grating installed. Micrometer setting for the gratings supplied with this instrument are listed in table below. The information tag on the back of each grating also shows the micrometer setting.

TABLE FOCUS TRIMMING ADJUSTMENT

Grating Serial Number	Grooves/mm	Blaze	Mirror Micro- Meter Setting
5445	1200	4000A	0.265
5446	1200	7500A	0.265
5447	600	4000A	0.275
5448	600	7500A	0.265
5449	300	7620A	0.285
5450	150	8000A	0.285
5458	1800	7500A	0.335

SUBJECT: Model 2075 Focus and Alignment Procedure

1. Refer to Section 3.3b and 3.5 Model 2075 Instruction Manual. If the temperature exceed  $68^{\circ}$  to  $80^{\circ}$ , or if the focusing mirror has to be adjusted more than  $\pm .005$  inch from the micrometer setting given for the grating (Section 3.4). IT MAY BE NECESSARY TO ADJUST BOTH THE COLLIMATING AND FOCUSING MIRRORS to maintain best focus over the complete wavelength range of the instrument.

2. To determine if the instrument is in best focus over the wavelength range, follow the procedure below:

- a.) Check for best focus using the procedure described in Section 3.5 at both central image (00000 counter reading) and the second order of 4358Å, (08716 counter reading with 1200 G/mm grating and gears installed.) Record the micrometer settings at central image and 8716Å. If the focusing micrometer setting is not the same at central image and the second order of 4358Å the collimating mirror must be adjusted to maintain best focus over the wavelength range of the instrument.

NOTE: A low pressure Hg Lamp such as a Pen Ray may be used

but due to the natural spectral line width, resolutions of 0.10Å may not be obtained. If a lamp such as this is used the instrument will be in best focus when the smallest half width is obtained.

3. The procedure for adjusting both the collimating and focusing mirrors is as follows:

- a.) Install a micrometer to move the collimating mirror. Record the micrometer setting.

- b.) Determine the difference in the focusing mirror micrometer settings at central image and second order of 4358Å recorded in Step 2a above.

- c.) If the micrometer reading is larger at the high wavelength, move the collimating mirror away from the entrance slit approximately

1/3\* the difference in the micrometer settings. If the micrometer reading is smaller at the high wavelength, move the collimating mirror toward the entrance slit approximately 1/3\* the difference in the micrometer setting. The image height should be checked for proper height after making mirror adjustments.

\*The exact preparation of adjustment for these mirrors varies from instrument to instrument and also changes as the difference in focus decreases. The final position must be determined experimentally.

- d.) Adjust the focusing mirror for best focus at central image and the second order of 4358Å and record the micrometer readings.
  - e.) If the focusing mirror micrometer settings are not the same at central image and second order of 4358Å, repeat Step 2b, 2c, and 2d until focusing mirror setting is the same at central image and the second order of 4358Å.
  - f.) The instrument is now at best focus for the existing environment.
4. If the instrument is to be operated in an abnormal attitude, such as on its side, the optical alignment and focus should be checked and adjusted if necessary.
  5. If the Model 2075 wavelength calibration check deviates more than five (5) counts at low and high wavelengths, the error could be caused by shifting of mirrors in the holders or the grating is not properly seated. The mirrors should be checked to insure contact against the mirror stops.

**CAUTION: DO NOT TOUCH OR BREATHE ON GRATING OR MIRROR SURFACES.**

- a) Push the mirror masks, opposite the mirror stops toward the mirrors.
- b) Push the outside edge of the mirrors toward the center of the instrument base.
- c) Push the top of the mirrors toward the instrument base.

The grating seats should be checked for dust or dirt.

- a) Remove the grating. (See Section 4.4 of Model 2075 Instruction Manual.)
- b) Wipe the rods and ball on the grating with a lint-free wiper.
- c) Wipe the "V" grooves with a lint-free wiper.
- d) Install the grating (See Section 3.3a of Model 2075 Instruction Manual.)

If the calibration check still deviates more than five (5) counts.

- a) Check and determine the wavelength error at second order of 5461Å.
- b) Check and determine the wavelength error at approximately half the total range.
- c) Check and determine the wavelength error at central image.

If the error is constant at these three (3) positions, something in the drive system may have slipped. Check drive for loose gears or couplings. If the error is not constant, contact McPherson Instrument Engineering or Assembly Department.

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## GENERAL DESCRIPTION

### 1.1 Optical System

The McPherson Model 2075 Monochromator-Spectrometer has a two mirror, plane grating, 0.75 meter focal length, optical system. Mirrors and slits remain in fixed positions while the grating is rotated for wavelength selection. The optical system has an f/5.3 effective aperture (6.5 with smaller grating).

### 1.2 Instrument Base

The optical components are mounted to a cast aluminum base. The top of the base is finished flat for mounting of the mirror, grating and precision drive screw assemblies. A separate casting is mounted to the base to support the slit assemblies and camera attachment. A light-tight cover allows easy access to internal components. The entire instrument is leveled using three adjustable feet.

### 1.3 Slit Assembly Mounting

Entrance and exit slit assemblies may be end or side mounted. Accessory 45° mirrors may be rotated out of the light beam for use of end mounted slits.

### 1.4 Slit Types

Entrance and exit slits may be the bilateral opening type, turret-mounted fixed width slits (4), or dovetail mounting fixed width slits. Fixed width slits require user selection of widths before delivery. Bilateral slit widths are adjustable from 5 microns to 4mm. Occulters are adjustable for spectral line heights to 20mm. Optional precision bilateral slit widths are adjustable from 5 microns to 2mm.

### 1.5 Slit Mounting Accessories

Some available accessories include camera attachment, light sources, detectors, double beam attachment and sample chamber. Also several combination of accessories are feasible. Two examples are: 1) a double beam system scan be installed at the side mounted exit slit and a detector at the end exit slit. The mirror therefore can be positioned to deflect the exit beam to the double beam system or moved out of the beam for standard monochromator operation, 2) light sources may be mounted to the two entrance slits and directed into the instrument as required.

### 1.6 Gratings

Gratings are "Snap-In"\* and therefore, easily interchanged and automatically aligned. (\*U.S. Patent #3,433,557)

#### 1.7 Wavelength Drive

A precision sine drive positions the grating to a selected wavelength or range. A Stepper Drive (Optional) controls wavelength output through a stepping motor coupled to the drive screw. The Stepper Drive displays wavelength in nanometers, or angstroms.

#### 1.8 Extended Wavelength Coverage

The grating mount may be rotated an additional  $20^\circ$  for echelle grating or extended wavelength use. In the  $20^\circ$  position, the upper wavelength limit is approximately  $1574\text{\AA}$  with a  $1200\text{ G/mm}$  grating installed.

#### 1.9 Instrument Support Table

A McPherson Model 090 Support\* is an accessory that provides a convenient and useful support for the instrument. Three adjustable legs provide leveling and height adjustment. Three casters allow for easy relocation. (\*U.S. Patent #3,329,105)

#### 1.10 Camera Attachment

The Model 2075-E Camera Attachment is designed for use on straight through or  $90^\circ$  exit slit positions. The camera attachment accepts a  $4'' \times 5''$  combination film/plate holder or a Polaroid  $4'' \times 5''$  Land Film Holder. The focal plane is 50 millimeters. The wavelength coverage is approximately  $550\text{\AA}$  with a  $1200\text{ G/mm}$  grating installed. Occulters are provided for adjustment of the spectral line height from 0 to 10 mm. A slide assembly enables multiple exposures over a 70 mm film or plate height. (When a Model 2075-E-30 Precision Camera Adjustment is provided, the film or plate height travel is 50mm.) The holders supplied by McPherson Instrument are modified to maintain an accurate focal plane distance. If standard holders are used, focus adjustments may be necessary.

#### 1.11 Mechanical Wavelength Counter

The mechanical wavelength counter is connected to the drive system of the Model 2075. The counter displays the wavelength at the exit slit of the Monochromator.

SPECIFICATIONS2.1 Instrument

Model 2075 high Performance Monochromator-Spectrometer

2.2 Optical System

a. Focal 0.75 meter

b. Optical Design Czerny-Turner

c. Mirrors Collimating and Focusing

d. Gratings "Snap-In"\* plane gratings with ruled or holographic area. (\*U.S. Patent #3,433,557)

BLANK AREA (mm)	RULED AREA (mm)
110 X 110	102 X 102
120 X 140	116 X 136

2.3 Mechanical

a. Slits

Bilateral, Adjustable slits, 5 to 4000 microns.  
 Slits have occulters for height and adjustment  
 from 0 to 20mm. Optional precision bilateral  
 slit adjustable from 5 to 2000 microns.

b. Slit Mounts

Standard mounting, end-on. Alternate side mounting  
 positions require 45° mirror for each slit assembly.  
 Mirror rotation feature permits operation at either  
 slit location.

c. Wavelength  
Scan

Manual sine drive system  
 Optional Stepping Drive System

d. Mechanical  
Counter

Mechanical wavelength counter to display the  
 wavelength at the exit slit in angstroms when  
 a 600 G/mm grating is installed.

2.4 Performance

a. Wavelength range

185 nm to 78 microns

b. Effective  
Aperture

f/5.3 (6.5 with smaller grating)

GRATING (G/mm)*	2400	1200	600	20
c. Wavelength Range	185 to 650 nm	185 nm to 1.3 $\mu$	185 nm to 2.6 $\mu$	185 nm to 78 $\mu$
d. 1st Order Littrow Blaze	240 nm 300 nm Holographic	250 nm 300 nm 500 nm 750 nm 1.0 $\mu$ Holographic	300 nm 500 nm 750 nm 1.0 $\mu$ 1.85 $\mu$	45 $\mu$
e. Resolution	.0155	.031	.062	1.86
f. Dispersion (nm/mm)	.555	1.11	2.22	66.6
g. Wavelength Range at Focal Plane	27.5 nm	55 nm	110 nm	3300 nm
h. Wavelength Accuracy		$\pm 0.05$ nm		
i. Wavelength Reproducibility		$\pm 0.005$ nm		

\* Other gratings are available

## 2.5 Input Power

Phase-switch dc power from the Stepper Drive System (Optional).

## 2.6 Physical

- a. Length 46½ inches
- b. Width 22-1/4 inches
- c. Height 15-3/4 inches
- d. Weight 210 pounds (with two slit assemblies)



## INSTALLATION

The instrument is completely assembled, aligned and tested before shipment. For shipping, slit mounted accessories and gratings are removed, and the precision sine drive and 45° slit mirrors are tied down. Read complete instruction manual before preparing and the instrument.

### 3.1 Locating the instrument

Locate the instrument in an area relatively free of corrosive fumes, high humidity and dust. Refer to Section 3.5, for environmental trimming. Place the instrument on a solid surface, free from mechanical vibrations and shocks, otherwise, optical performance may be affected.

The instrument has three support points and no leveling adjustment is necessary when placed on a reasonably level surface. Position instrument so that all sides are accessible for convenient.

### 3.2 Removal of Shipping Ties and Protective Covers

To prevent damage during shipping the precision sine drive is protected by securing the grating mount lever arm against the 1 block, and the precision screw is covered. The following procedures refer to items in Figure 2 except where noted otherwise.

#### a. Removal of Shipping Ties

1. Lift off the instrument cover, Fig. 1.1.
2. Remove the tape and protective cover from the precision screw and lever arm, Item 8.

#### **CAUTION: DO NOT TOUCH THE PRECISION SCREW ASSEMBLY**

3. Cut the tie holding the lever arm against the teflon protective pad and driving block, Item 7. Discard the tie.
4. Pull the lever arm away from the driving block about  $\frac{1}{2}$  inch and remove the teflon pad. Carefully bring the lever arm in contact with the block.

#### **CAUTION: DO NOT ALLOW LEVER ARM TO STRIKE BLOCK WITH FORCE.**

#### b. Releasing the Slit Mirrors

When 45° Entrance and Exit Slit Mirrors are factory installed, they are immobilizing during shipment to protect them from damage. They are immobilized with a spring (painted red) connected from the pin, Item 14, on the mirror assembly to a 5-40 cap screw on the side of the slit bracket. To release the mirror holder, it is necessary to remove the baffle in front of the mirror assembly for access to the spring.

**CAUTION: WHEN THE BAFFLE IS REMOVED THE MIRRORS ARE EXPOSED.  
DO NOT TOUCH OR BREATHE OVER THE MIRROR SURFACES.**

Remove the immobilizing Spring as follows:

1. Remove the Spring (painted red) by sliding down the pin, Item 14, until it releases.
2. Remove the spring from the cap screw at side of slit bracket and discard the spring.
3. Slide the remaining spring down the pin, Item 14, of the mirror assembly until spring seats in pin groove.
4. Remove the protective cover on the mirror stop, Item 15.
5. Follow the same procedure for the other mirror assembly.

**NOTE: THE BAFFLE IS NOT SHOWN IN THE FIGURE. IT HAS BEEN REMOVED TO HELP IDENTIFY ITEM BEHIND IT.**

c. Removing Protective Covers

The focusing and collimating mirror assemblies, Figure 5, are shipped with protective covers. Remove them as follows:

1. Remove the tape holding the protective cover to the collimating mirror holder.
2. Slide the protective cover over the springs and should screw on the mirror holder.

**CAUTION: MIRROR IS NOW EXPOSED. DO NOT TOUCH OR BREATHE OVER THE MIRROR SURFACE.**

3. Ensure that collimating mirror, Item 2, is seated by lightly pushing the mirror mask, Item 1, toward the mirror at the three (3) spring and shoulder screw positions.
4. Repeat Steps 1-3 for the focusing mirror assembly, Item 9, except in Step 3, substitute Items 7 and 8 for items 1 and 2.
5. Replace the instrument cover.

3.3 Grating Installation

Gratings are individually boxed, Figure 3, for protection during shipment and storage. An external label indicates grating part number, serial number, coating (if applicable), rulings per millimeter and blaze wavelength. Gratings should remain sealed in box until installation instructions have been carefully read and the instrument is ready for grating installation. gratings are further identified by a label on the back of the grating.

a. Mounting the Grating

There are two different size gratings and a procedure for installing each. Follow Steps 1 and 2 below for either size grating. Go to Step 3 when installing the 110 X 100 mm grating or, go to Step 4 when installing the 120 X 140 mm grating.

1. Remove the instrument cover.

**CAUTION: DO NOT TOUCH THE PRECISION SCREW ASSEMBLY.**

2. Identify the box, Figure 3, containing the grating to be installed and proceed as follows:
  - a. Place the box, face up, in a convenient location (McPherson name tag readable). Familiarize yourself with the grating holder, Figure 2.
  - b. With box on working surface, remove tape from around box.
  - c. Carefully open the box.

**CAUTION: GRATING FACE IS NOW EXPOSED AND DAMAGE BEYOND REPAIR CAN RESULT BY CONTACT WITH ANY VAPOR, LIQUIDS OR SOLIDS. DO NOT BREATHE OR TOUCH RULED AREA.**

- d. Visually locate the kinematic mounting points of the grating. The two half rounds rods, Figures 3.5 and 3.6, mate in "v" grooves Figure 2.12, of the grating holder, Figure 2.21. The half ball, Figure 3.2 locates in the cantilever type spring hole, Figure 2.20.
- e. Locate the thumb and finger access, Figure 3.7 and 3.4, in the grating box.

3. To install a 110 X 110 mm grating:

- a. Carefully grasp grating with thumb, middle and ring fingers positioned as shown in Figure 4A. Keep thumb, middle and ring fingers arched, index and little fingers straight to avoid contacting ruled surface of grating.
- b. Carefully lift the grating out of the box and check label on back to ensure that correct grating is being installed. Insert into holder Figure 2.21, by positioning the rods, Figure 3.5 and 3.6, into the "v" grooves, Figure 2.12 then tilt grating toward holder until ball, Figure 4A.1, locates in spring hole, Figure 2.20.
- c. Use light side-to-side pressures to ensure that grating is properly positioned. A definite click can be heard when ball mates with spring hole.

4. To install a 120 X 140 mm grating.

- a. Carefully grasp grating with both hands using thumb and index finger as shown in Figure 4B.
- b. Follow Steps 3.b and 3.c above to position grating, except, refer to Figure 4B instead of 4A.

b. Focus Trimming Adjustment (Refer to Figure 5)

Since there are variations in the wavefront (flatness) of the best available plane gratings, a focus trimming adjustment may be required. This will ensure optimum performance when interchanging gratings in a high resolution spectrometer.

The Model 2075 is factory aligned and focus adjusted with a master grating having minimum wavefront error. The focusing mirror, item 6, is positioned at a micrometer, item 3, setting of .300 with the master grating installed. Micrometer setting for the grating supplied with this instrument are listed in Table 1. The information tag on the back of each grating also shows the micrometer setting.

TABLE 1. Focus Trimming Adjustment

GRATING SERIAL NUMBER	GROOVES/MM	BLAZE	MIRROR MICRO METER SETTING*

\* Refer to Section 3.5 for environment conditions.

If the micrometer setting for the grating being installed differs from the actual micrometer reading in the instrument, adjust as follows:

1. Remove the instrument cover, Figure 1.1

**CAUTION: USE EVERY PRECAUTION TO AVOID CONTACT WITH OR BREATHE  
ON MIRROR SURFACES OR IRREPAIRABLE DAMAGE MAY RESULT.**

2. Loosen torque screw, Item 5, one (1) full turn.
3. Use the right hand to adjust focusing mirror micrometer, Item 3, to the exact setting indicated for the grating installed. At the same time, with the left hand, pull the adjusting handle, Item 4, to ensure a light but positive contact of the mirror base against the micrometer spindle.
4. Maintain mirror mount contact with micrometer spindle and tighten torque screw, Item 5.
5. Replace instrument cover.

3.4 Input Power

Plug in limit switch cable from optional Stepper Drive System to the connector on the instrument. (connection is made on the side of the instrument containing the stepping motor).



### 3.5 Performance Trimming for Environment (Temperature)

The Model 2075 is a precision monochromator, therefore, the wavelength calibration and resolution (focus) may be affected by temperature change. The Model 2075 should be operated in a temperature surrounding of 68 to 80°F and constant within  $\pm 2^\circ\text{F}$ . If this environment is not attainable, contact a local representative or McPherson Instrument for further information.

Since the mean temperature of laboratories vary, the Model 2075 provides the necessary adjustment for resolution (focus). The operator must be familiar with the optional Stepper Drive to perform the following procedure. Refer to the stepper drive Manual for operating instructions on wavelength drive.

To calibrate the wavelength drive and for greatest accuracy, scans must be made from lower to higher wavelengths (increasing counter reading). The scan should be started at least  $5\text{\AA}$  below the wavelength of interest. When initially scanning the instrument, several scans should be made over the wavelength range to assure proper distribution of lubricant between the precision screw and nut. The maximum intensity of peak of central image and spectral lines may be determined visually; but for greatest accuracy, it should be determined photo-electrically and electrically scanned from lower to higher wavelengths. If determining photo-electrically, the cover has to be removed and replaced for each adjustment.

**CAUTION: CLOSE SHUTTER ON EXIT SLIT ASSEMBLY BEFORE REMOVING COVER TO PROTECT PHOTOMULTIPLIER TUBE.**

If adjustment is necessary for maximum resolution, follow the procedure below.

#### a. Resolution (focus) Adjustment

1. Adjust entrance and exit slit occulters to a 4 mm height and the slit width to 10 microns or less.
2. Check collimating and focusing mirrors to ensure proper seating. (See installation instructions, Section 3.2c).
3. Install a line source, such as a low pressure Hg lamp, on the entrance slit (either end-on or side position). Check image height at exit slit.

**NOTE: IF CHECKING FOR ULTIMATE INSTRUMENT RESOLUTION, A LIGHT SOURCE CAPABLE OF PROVING LINE SPECTRA WITH NATURAL WIDTHS OF 0.01 ANGSTROMS OR LESS, SUCH AS THE HOLLOW CATHODE LAMPS USED FOR ATOMIC ABSORPTION, MUST BE USED.**

4. Install a suitable detector on the exit slit assembly (either end-on or side position).
5. Connect the detector to the suitable amplifier/recorder system.
6. Slew up or down to the approximate wavelength of desired spectral line.
7. Scan to about 0.2 nm below spectral line.

8. Scan over spectral line. recommended scanning speed is 0.05 nm/min. and recorder chart speed is 1 in/min. Measure the half width of the line on the chart paper.

**NOTE: HALF WIDTH IS DETERMINED BY MEASURING THE FULL WIDTH OF THE LINE AT HALF THE PEAK INTENSITY.**

9. Adjust the focusing mirror in .001 inch increments until the smallest half width is obtained. (refer to Section 3.3b for adjustment of focusing mirror).

**CAUTION: CLOSE SHUTTER ON EXIT SLIT ASSEMBLY BEFORE REMOVING INSTRUMENT COVER TO PROTECT PHOTOMULTIPLIER TUBE.**

If the adjustment exceed  $\pm .005$  inches from the micrometer setting specified for the grating installed, contact a local representative or McPherson Instrument.

The instrument is now adjusted for maximum resolution in the existing temperature environment.

b. Wavelength Calibration

1. Calibration Check at Central Image

Mount a low pressure Hg lamp on the entrance slit (entrance and exit slits 4mm height, 10 $\mu$  width). Scan over central image and record the counter reading at maximum intensity. If the error is greater than five counts, contact a McPherson representative. If less than five counts, follow the procedure below:

- a) Scan to a wavelength counter reading of 0000
- b) Remove the manual scan knob and mechanical counter cover located in front of the instrument.
- c) Loosen the miter gear on the mechanical counter shaft.
- d) Rotate the other miter gear by hand until maximum signal is reached.
- e) Maintain a wavelength counter reading of 0000 with central image at maximum intensity and tighten the miter gear on the counter shaft. Readjust if necessary until the counter reads 0000 with central image at maximum intensity when scanning as described above.
- f) Replace counter cover and manual knob.

2. Calibration Check at a High Wavelength

Scan instrument to the second order of 5461 $\text{\AA}$  (10922 counter reading with 1200 G/mm grating and gears installed) or fourth order of 5461 $\text{\AA}$  (21844 counter reading with 600 G/mm grating and gears installed). Scan the instrument until a maximum signal is reached at this wavelength and note the counter reading. If counter is high or low, the lever arm length must be adjusted following the procedure below:

**NOTE: IF COUNTER READING IS TOO HIGH, LEVER ARM MUST BE SHORTENED.  
IF COUNTER READING IS TOO LOW, LEVER ARM MUST BE LENGTHENED.**

- a) Remove cover and loosen lever arm clamp screw (Fig. 2.22) approximately one turn. This screw clamps the lever arm shaft (Fig. 2.8) to lever arm casting.

- b) Rotate knurled nut (Fig. 2.23) to make lever arm longer or shorter.

**NOTE: WITH A 1200 G/MM GRATING INSTALLED, A .005 INCH CHANGE IN LEVER ARM LENGTH CHANGES THE COUNTER READING APPROXIMATELY SIX COUNTS.**

- c) Tighten lever arm clamp screw (Fig. 2.22).
- d) Re-scan the same wavelength and record counter reading at maximum signal.
- e) Repeat steps a, b, c and d until wavelength and counter reading are matched.
- f) Re-check wavelength calibration at central image. If there is any error, repeat procedures one and two.

### 3.6 Slit Mount Accessories

A number of sources and detector systems, including a double beam system, are available for mounting to McPherson slit assemblies.

Before installation on any slit assembly, the slit occulters must be adjusted. To make this adjustment, refer to the accessory manual for the opening required and adjust per section 4 of this manual.

### 3.7 Mounting the Camera Attachment

The camera attachment mounts on the Model 2075 Monochromator at either exit slit position, Figure 6. In the side mounted position a 45° Exit Mirror Assembly is required for operation. Before mounting, an adapter must be fastened to the camera base in the correct orientation.

#### a) End Mounting the Camera Attachment

- 1. Ensure that adapter is fastened to the camera base as shown in Position A of Figure 6. If it is necessary to change adapter position, proceed as follows:

- a) Remove the four (4) 10-32 X  $\frac{1}{2}$ " cap screws holding the adapter to the camera base.
- b) Position adapter in correct orientation on the camera base and reinstall the four (4) cap screws.
- 2. Remove the instrument cover, Figure 1.1.

**CAUTION: USE EVERY PRECAUTION TO AVOID CONTACT WITH OR BREATHING ON GRATING OR MIRROR SURFACES OR IRREPARABLE DAMAGE MAY RESULT.**

- 3. Remove the grating, see Section 4.4.

- 4. Remove the exit baffle, Figure 2.2.

**CAUTION: WHEN 45° EXIT MIRROR IS MOUNTED ROTATE OUT OF THE BEAM BEFORE PROCEEDING.**

- 5. Locate the four (4)  $\frac{1}{4}$ -20 cap screws inside the instrument that retain the exit port cover or exit slit assembly.

6. Remove these (4) screws to release the exit port cover (or slit assembly if mounted). Retain these screws with the cover.
7. Mount the camera assembly with the four (4)  $\frac{1}{4}$ -20 X 1-1/8" cap screws supplied.
8. Reinstall the exit baffle, Figure 2.2.
9. Reinstall the grating, see Section 4.4.c and 3.3.
10. Replace the instrument cover.

Camera is now ready for loading, see Camera Operation, Section 4.6.

b) Side Mounting the Camera Attachment

1. Follow procedure in Section 3.7a, except fasten adapter to camera base as shown in Position B of Figure 6.
2. Protect the 45° exit mirror to prevent damage to front surface.
3. Position mirror so that it intersects the exit beam for camera operation.

Camera is now ready for loading, see Camera Operation, Section 4.6.

3.8 COLLIMATING AND FOCUSING MIRROR MASKS

The collimating and focussing mirror assemblies are equipped with two masks. The first mask is for 110 x 110 gratings and is removeable to expose the mask for the 120 x 140 gratings.

- a. To exposure the mask for the 120 x 140 gratings, remove the four screws, located in the corners of the 110 x 110 masks, and remove the mask carefully.



OPERATION

On completion of the installation procedures the instrument is ready for operation.

4.0 Bilateral Slitsa) Adjustment of Slit Width

The bilateral slit widths are adjusted by a micrometer. The slit micrometer thimble has 25 graduations, each representing 10 microns. A full rotation of the thimble therefore represents 250 microns. Each thimble rotation is represented by one graduation on the micrometer barrel and the 16 graduations represent maximum slit opening 4mm. A mechanical stop prevents the slit jaws from closing below 5 microns.

**CAUTION: DO NOT ROTATE THIMBLE BEYOND THE MECHANICAL STOP OR SLIT MAY BE DAMAGED.**

b) Adjustment of Slit Height (Spectral Line Length)

Slit heights can be indexed into position externally by a control knob and shaft located next to the slit micrometer. The height control shaft has six (6) detent positions for indexing the desired slit height into position. Slit heights of 2, 4, 6, 8, 16 and 20 nm indented into position correspond to the number located on the control shaft. (Readable next to the slit body outside diameter).

c) Shutter Operation

Each entrance and exit slit assembly contains a shutter. The shutter has two (2) detent positions and is controlled by a knob Figure 1.4, located on top of the slit assembly. When the knob is pointing at the light source or detector, the shutter is open. Rotate the knob clockwise 90° to close the shutter.

4.1 Bilateral Slits (Optional Precision Type)a) Adjustment of Slit Width

The bilateral slit widths are adjusted by a micrometer. The slit micrometer thimble (knob) Figure 1.6 has 20 graduations, each representing 10 microns. A full rotation of the thimble therefore represents 200 microns with 0, 50, 100 and 150 microns positions numbered. Each thimble rotation is represented by one graduation on the micrometer barrel and the 10 graduations position are numbered. A mechanical stop prevents the slit jaws from closing below 5 microns.

**CAUTION: DO NOT ROTATE THIMBLE BEYOND 2MM OR SLIT MAY BE DAMAGED.**

b) Adjustment of Slit Height (Spectral Line Length)

Slit height adjustments must be made before mounting an accessory to the slit. Immediately in front of the slit jaws are two vertical scales. The height limiting apertures (occluders), Figure 1.9 are fastened to these scales. Each scale graduation represents a mm and the red line indicates the center of the slit.

b) Adjustment of Slit Height (Spectral Line Length)

To adjust slit height, loosen screws holding one occulter and adjust 1/2 the number of graduations above or below the red line representing the slit height desired. Adjust the second occulter an equal number of graduations in the opposite direction from the red line.

c) Shutter Operation

Each entrance and exit slit assembly contains a shutter. The shutter has two (2) detent positions and is controlled by a knob Figure 1.4, located on top of the slit assembly. When the knob is pointing at the light source or detector, the shutter is open. Rotate the knob clockwise 90° to close the shutter.

4.2 Wavelength Scanning

Speed commands are implemented at the optional Stepper Drive. Refer to optional stepper control instruction manual for description and operation.

4.3 Positioning Grating for "Normal" or "20° Extended Wavelength" Operation

The instrument is normally supplied with the grating at "Normal" operating position.

a) Determining Grating Holder Position (Refer to Figure 2)

A lever arm, Item 8, is attached to the bottom of the grating holder, item 21, by a split clamp held closed by a 10-32 cap screw.

The lever arm contains two mechanical stops, items 4 and 11. A holder arm, item 9, fastened permanently to the grating holder, is positioned against one of the mechanical stops. The holder arm against stop, item 4, positions the grating for normal operation.

b) Changing Grating Holder Position

1. Remove the instrument cover, Figure 1.1.
2. Remove grating if installed, see Section 4.4.
3. If 45° Entrance and Exit Slit Mirrors are installed, rotate out of beam position to avoid contact with reflecting surfaces.
4. Scan until stopped by high wavelength limit switch. The 10-32 socket head cap screw closing the lever arm clamp is now visible at the bottom of the grating holder.
5. Release the lever arm clamp by loosening the 10-32 screw.

**CAUTION: MAINTAIN THE LEVER ARM, FIGURE 2.8, AGAINST THE DRIVING BLOCK, FIGURE 2.7, TO PREVENT DAMAGE TO EITHER.**

6. Hold lever arm against driving block and rotate the grating holder until holder arm, Figure 2.9, hits the stop, Figure 2.11.

**CAUTION: STOP SCREWS ARE FACTORY ADJUSTED AND MUST NOT BE CHANGED.**

7. Tighten the 10-32 cap screw to clamp lever arm to grating holder. This will secure holder arm in the alternate position.
8. Reinstall the grating, see Section 3.3 and 3.5.
9. Replace the instrument cover.

Instrument is now ready for operation in the 20° extended wavelength position.

#### 4.4 Exchanging Gratings

**CAUTION: GRATINGS ARE EASILY DAMAGED DURING HANDLING. TAKE EVERY PRECAUTION TO ENSURE THAT PROPER PROCEDURES ARE FOLLOWED.**

##### a) Before Removing Grating

1. Identify the grating storage box for the grating being removed and locate in a position convenient to the instrument. Open the box as shown in Figure 4.
2. Place the box containing the grating to be installed nearby. Do not remove sealing tape or open grating box at this time.

##### b) Removing the Grating

There are two different size gratings and a procedure for removing each. Follow Steps 1-3 below for either size grating. Go to Step 4 when removing the 110 X 110 mm grating, or go to Step 5 when removing the 120 X 140 mm grating.

1. Scan to 00000 wavelength (central image) position.
2. Remove the instrument cover, Figure 1.1.

**CAUTION: DO NOT TOUCH THE PRECISION DRIVE SCREW**

3. Open the empty grating box and place in a convenient location to receive the grating.

4. To remove the 110 X 110 mm grating:

- a) Carefully grasp grating with thumb, middle and ring fingers positioned as shown in Figure 4a. Keep thumb, middle and ring finger arched, index and little fingers straight to avoid contact with ruled surface of the gratings.
- b) Tilt the top of grating away from holder and remove from instrument. Ensure that label information on back of grating matches information on storage box cover.

c) Immediately place the grating in storage box with half ball Figure 3.2 located toward hinge of box.

d) Carefully locate grating in the box to permit retainers Figure 3.1, to clamp grating properly.

e) Close box and seal edges with tape.

5. To remove the 120 X 140 mm grating:

a) Carefully grasp grating with both hands using thumb and index finger as shown in Figure 4B.

b) Follow Steps 4b-e above.

#### C. Reinstall a Grating

1. Before reinstallation, refer to Table 1 and determine if focus trimming is necessary. If it is, see Section 3.3b.

2. When using the 20° extended wavelength position and it is necessary to return the normal wavelength position, make the change before mounting grating. (Refer to Section 4.3)

3. The grating may now be mounted in the instrument following the procedures outlined in Section 3.3a.

#### 4.5 Positioning of Entrance and Exit Slit Mirrors (Optional For Operation

##### a) Four Slit Positions

Slit assemblies may be end mounted, side mounted, or up to four slit assemblies can be mounted at the same time.

For operation each side mounted slit requires a mirror positioned at 45° to normal optical path. These mirrors may be rotated out of the beam when end mounted slits are used.

##### b) Positioning Mirrors for Side Slit Operation

Mirrors are correctly positioned when the mirror knobs, Figure 1.2 and 1.3 are 45° to the beam.

**CAUTION: MIRRORS ARE SPRING LOADED IN BOTH DIRECTIONS, ROTATE MIRROR POSITIONING KNOBS SLOWLY AND CAREFULLY TO PREVENT SNAPPING AGAINST STOPS OR STOPS MAY BE DAMAGED CAUSING INACCURACIES IN MIRROR ADJUSTMENT.**

##### C) Positioning Mirrors for End Slit Operation

Mirrors are correctly positioned when the mirror knobs, Figure 1.2 and 1.3 are parallel to the length of the instrument.

#### 4.6 Camera Operation

The Model 2075-E Camera Attachment is designed to accept a 4" X 5" land film holder modified to an accurate focal plan distance. The holders are available from McPherson Instrument

##### a) Adjustment of Standard Camera Back

The camera back has a total vertical travel of 70 millimeters. A scale graduated in 1 mm increments indicates position of the camera back for multiple exposures. Position the camera back as follows:

1. Loosen the clamping screw (See Figure 6).
  2. Position camera back by sliding in the camera bases until the desired scale position is reached.
  3. Tighten clamping screw.
- b) Adjustment of Camera Back with a Precision Camera Adjustment (Optional Factory installed Accessory)

Refer to Figure 7 in the following discussion.

The camera back with a precision adjustment installed has a total vertical travel of 5 mm. A scale graduated in 1-mm increments indicates position of the camera back for multiple exposures. A knob, Item 3, is used to move the camera back, Item 5. One (1) revolution of the knob moves the camera back one (1) mm. A detent position is engaged for each revolution. A fiducial mark, Item 2, on the knob is easily referenced to a similar mark, Item 1, on the drive block.

To position the camera back, rotate the knob until the camera is at the desired scale position.

##### c) Adjusting Spectral Line Height

1. Position the camera back to a scale reading of 35mm.
2. The masks limiting the spectral line height are not exposed. Loosen the screws and position each mask above and below center position of the scale 1/2 the number of divisions representing the desired spectral height. Tighten the screws.

##### d) Loading the Film Holder

Original Equipment Manufacturer's Instructions for loading and operation of the holder is supplied with the holder.

##### e) Positioning Holder in Camera

Slide the Holder into the camera back until it is seated against the stop. Springs will retain the holder firmly against the camera back.

##### f) Film Exposure Preparation

1. Ensure that entrance slit shutter, Figure 1.4, is closed.



Film Exposure Preparation

2. Adjust camera back to desired position.
3. Ensure that film is properly prepared for exposure. (see Original Equipment Manufacturer's instructions for holder).
4. Exposure film or plate using the entrance slit shutter to control exposure time.

## PURGING

### 5.1 Description

For absorption or emission studies from approximately 1950Å to below 1800Å, it is necessary to eliminate oxygen from the optical path of the system. Oxygen will absorb strongly in this region and must be displayed by a transparent gas to allow sufficient radiation emitted by the source to reach the detector. The Model 2075 is designed for purging with nitrogen.

The optional purging kit consists of gas inlet and gasketing to sufficiently seal the instrument for purging. The purging gas enters the instrument base and exhausted through the light source and detector housing.

If the monochromator is equipped for purging and is used with a McPherson Model 613 Xenon source, the gas used to cool the lamp may be used to purge the monochromator. (Refer to Model 613 Instructions).

### 5.2 Purging Model 2075

1. Provide a gas exhaust in the source and detector housings.
2. Connect the gas supply to the gas inlet ( $\frac{1}{4}$  inch hose connector) at the mirror end of the instrument base.

**NOTE: A FLOW METER SHOULD BE INSTALLED BETWEEN THE GAS SUPPLY AND THE CONNECTOR TO MEASURE THE FLOW OF GAS.**

3. Turn the purging gas and adjust the flow to 3.5 liters per minute and purge for 20 hour. The purging progress can be checked by scanning from 1800Å to 2000Å. Sharp and regular appearing absorption bands indicate the presence of oxygen. Continue to purge until there is a usable signal over the desired wavelength range.
4. After the desired signal is reached, the gas flow may be reduced to 2 liters per minute.

### 5.3 Purging Models 613 and 2075

1. Provide an exhaust port in the detector housing.
2. Seal the purging gas inlet ( $\frac{1}{4}$  inch hose connector) located at the instrument base.
3. Refer to Model 613 Instruction Manual (Section IV) for sealing housing and gas connection.
4. Turn on purging gas and adjust the flow to 3.5 liters per minute and purge for 20 hours. The purging progress can be checked by scanning from 1800Å to 2000Å. Sharp and regular appearing absorption bands indicate the presence of oxygen. Continue to purge until there is a usable signal over the desired wavelength range.
5. After the desired signal is reached, the gas flow may be reduced to 2 liters per minute.

**CAUTION: A MINIMUM GAS FLOW OF 2 LITERS PER MINUTE MUST BE MAINTAINED FOR COOLING THE XENON LAMP.**

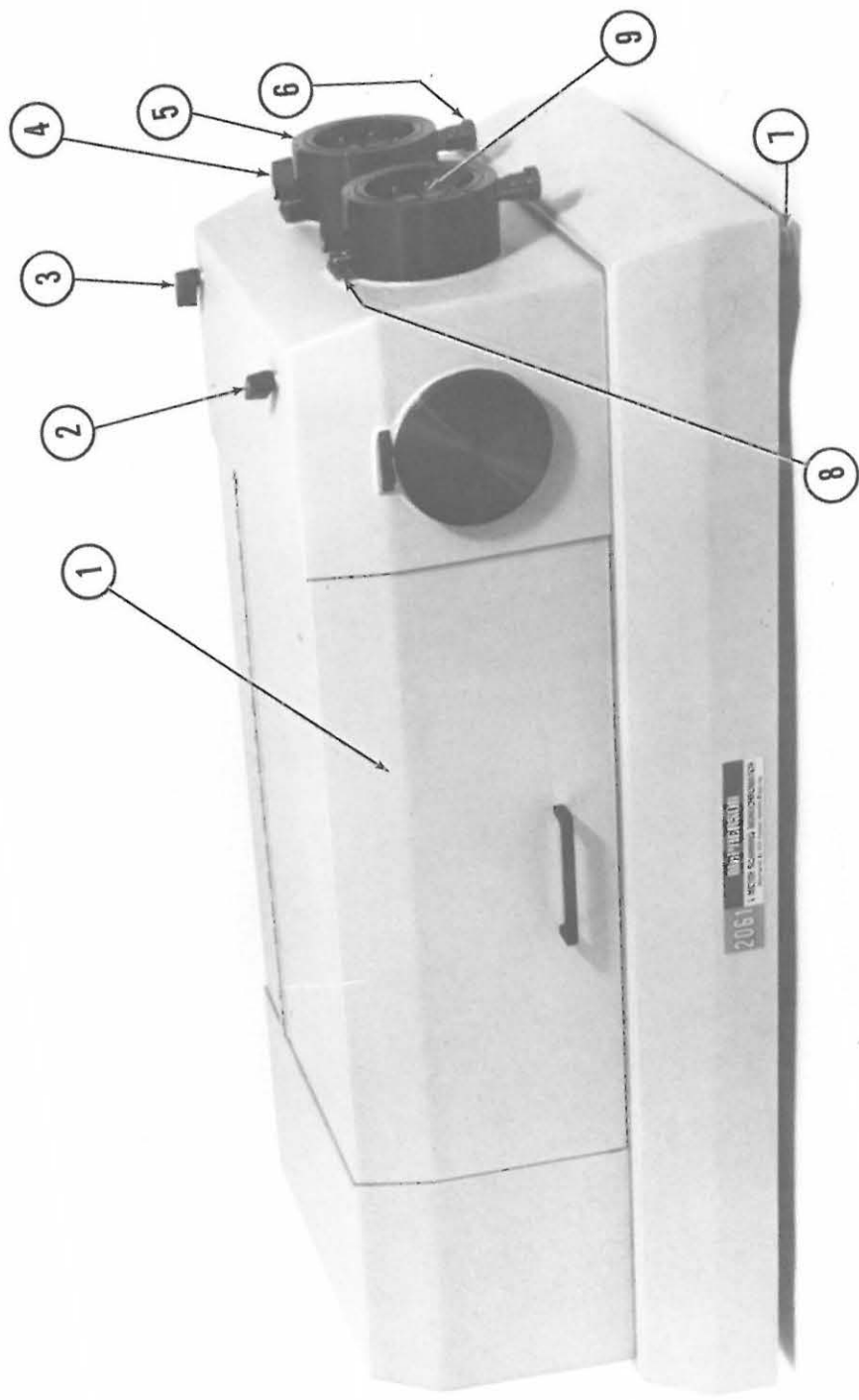


FIGURE 1

- |     |                          |
|-----|--------------------------|
| 1.1 | Cover Mirror Knob        |
| 1.2 | Exit Mirror Knob         |
| 1.3 | Entrance Mirror Knob     |
| 1.4 | Shutter Knob Face        |
| 1.5 | Slit Mounting Face       |
| 1.6 | Slit Micrometer (1 of 3) |
| 1.7 | Adjustable Foot          |
| 1.8 | Tangent Block            |
| 1.9 | Slit Occulters           |

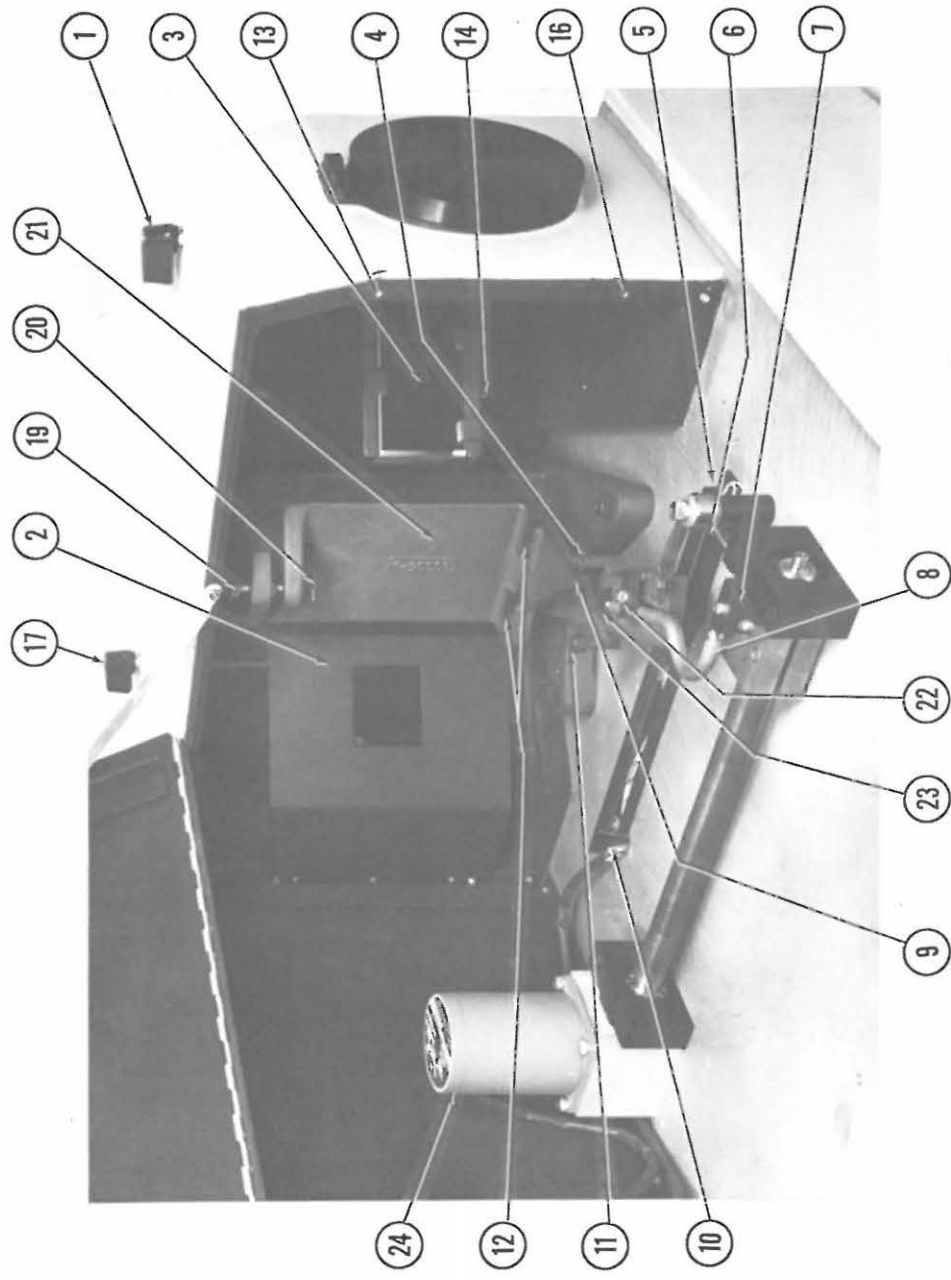
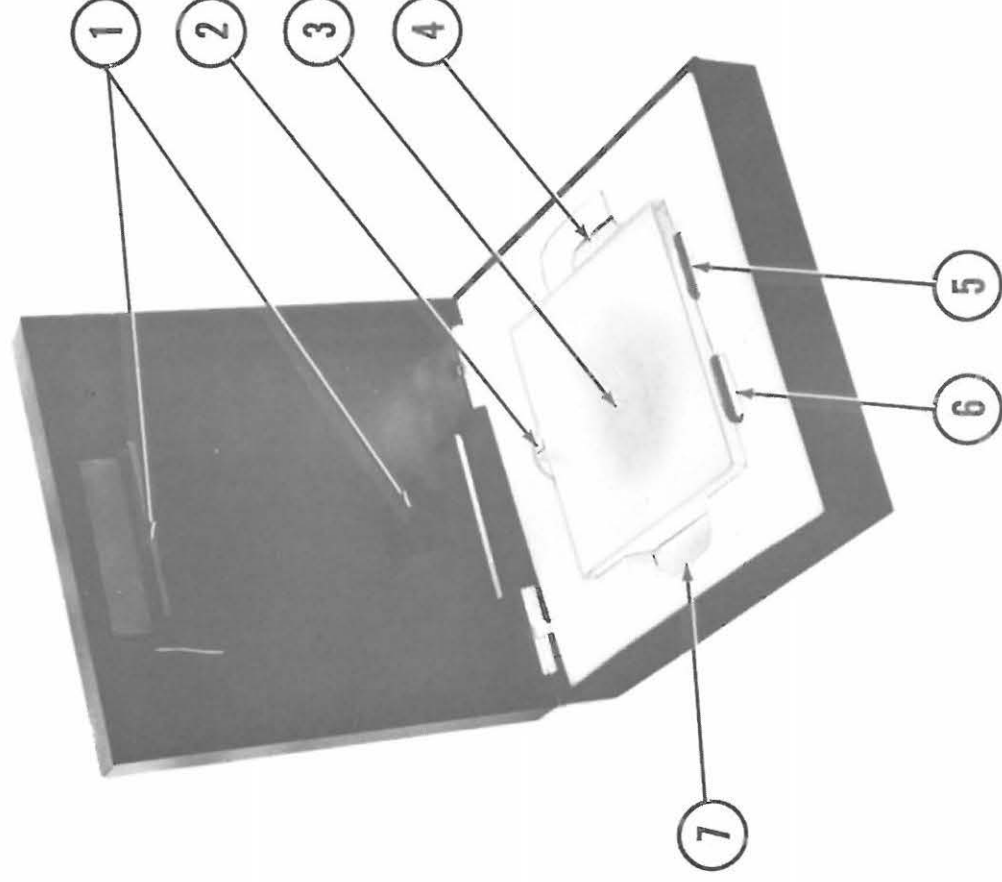


FIGURE 2

- |      |   |
|------|---|
| 2.1  | Exit Mirror Knob                                  |
| 2.2  | Entrance Baffle                                   |
| 2.3  | Exit 450 Mirror                                   |
| 2.4  | Normal Position Stop                              |
| 2.5  | Limit Switch ("Zero" Wavelength)                  |
| 2.6  | Nut Guide   |
| 2.7  | Driving Block                                     |
| 2.8  | Lever Arm   |
| 2.9  | Holder Arm  |
| 2.10 | Limit Switch (High Wavelength)                    |
| 2.11 | 20° Extended Position Stop                        |
| 2.12 | "V" Grooves                                       |
| 2.13 | Mounting Hole (1 of 2)                            |
| 2.14 | Mirror Spring Pin                                 |
| 2.15 | Mirror Stop (Not Shown - Back Side Mirror Holder) |
| 2.16 | Mounting Hole (2 of 2)                            |
| 2.17 | Entrance Mirror Knob                              |
| 2.18 | Slit Mounting Screws (Not Shown - Inside Bracket) |
| 2.19 | Holder Pivot                                      |
| 2.20 | Spring  |
| 2.21 | Grating Holder                                    |
| 2.22 | Lever Arm Clamp Screw                             |
| 2.23 | Knurled Nut                                       |
| 2.24 | Stepping Motor                                    |

FIGURE 3



- 3.1 Retainers
- 3.2 Half Ball
- 3.3 Grating Face (Rulings)
- 3.4 Finger Recess
- 3.5 Positioning Rod
- 3.6 Positioning Rod
- 3.7 Thumb Recess



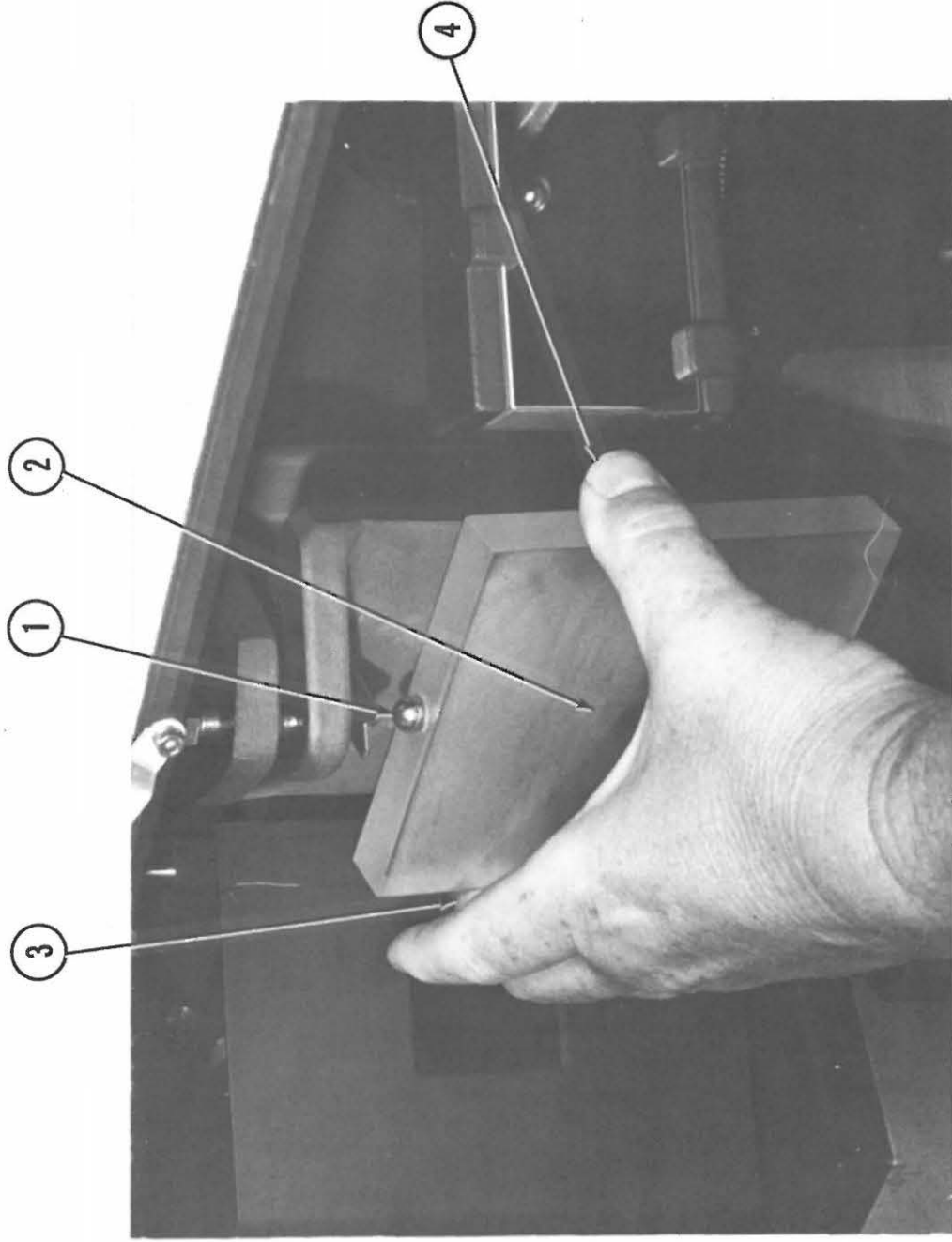


FIGURE 4A

- 4.1 Half Ball
- 4.2 Grating Face
- 4.3 Finger Positions
- 4.4 Thumb Position

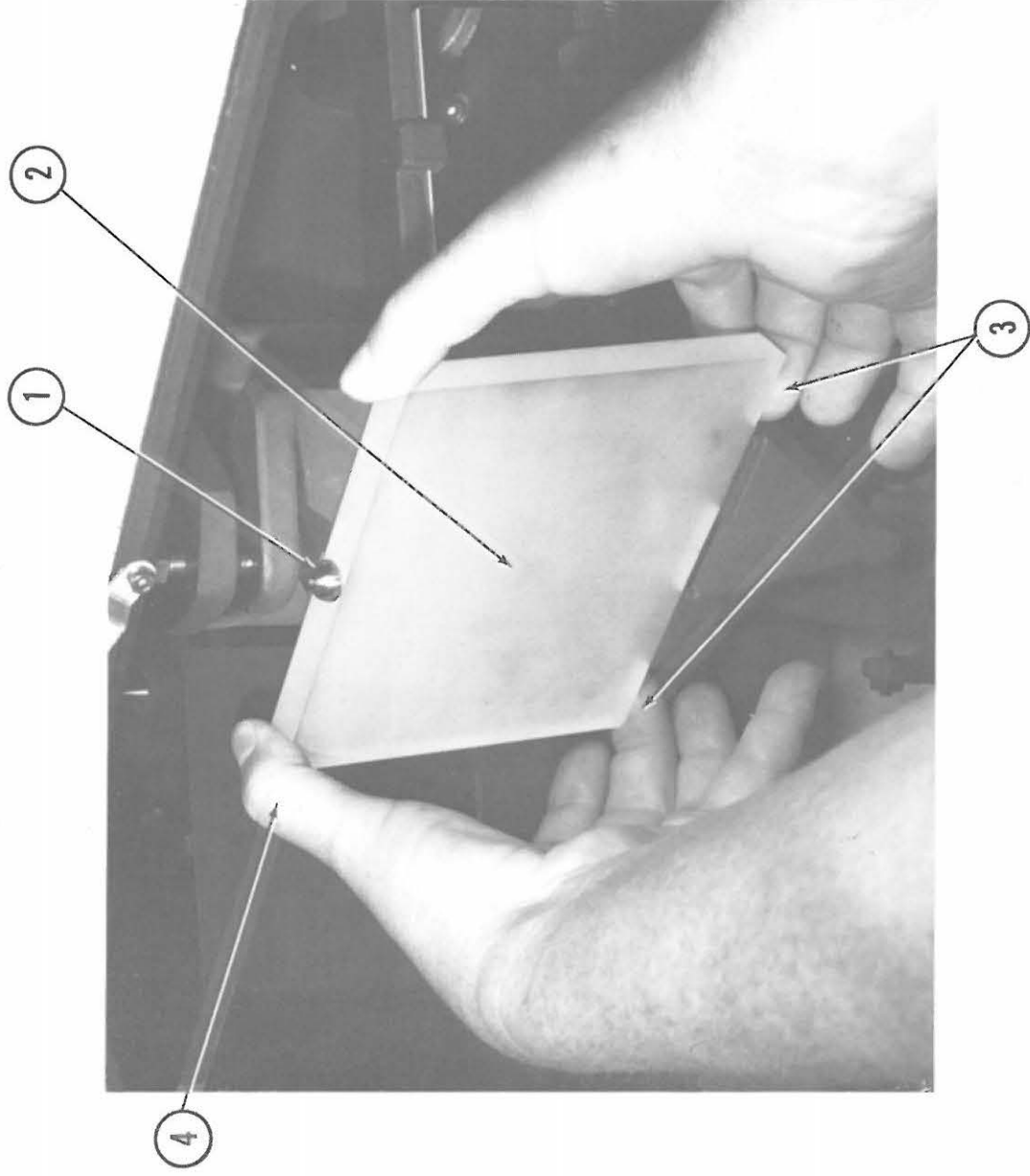


FIGURE 4B

- 4.1 Half Ball
- 4.2 Grating Face
- 4.3 Finger Positions
- 4.4 Thumb Position

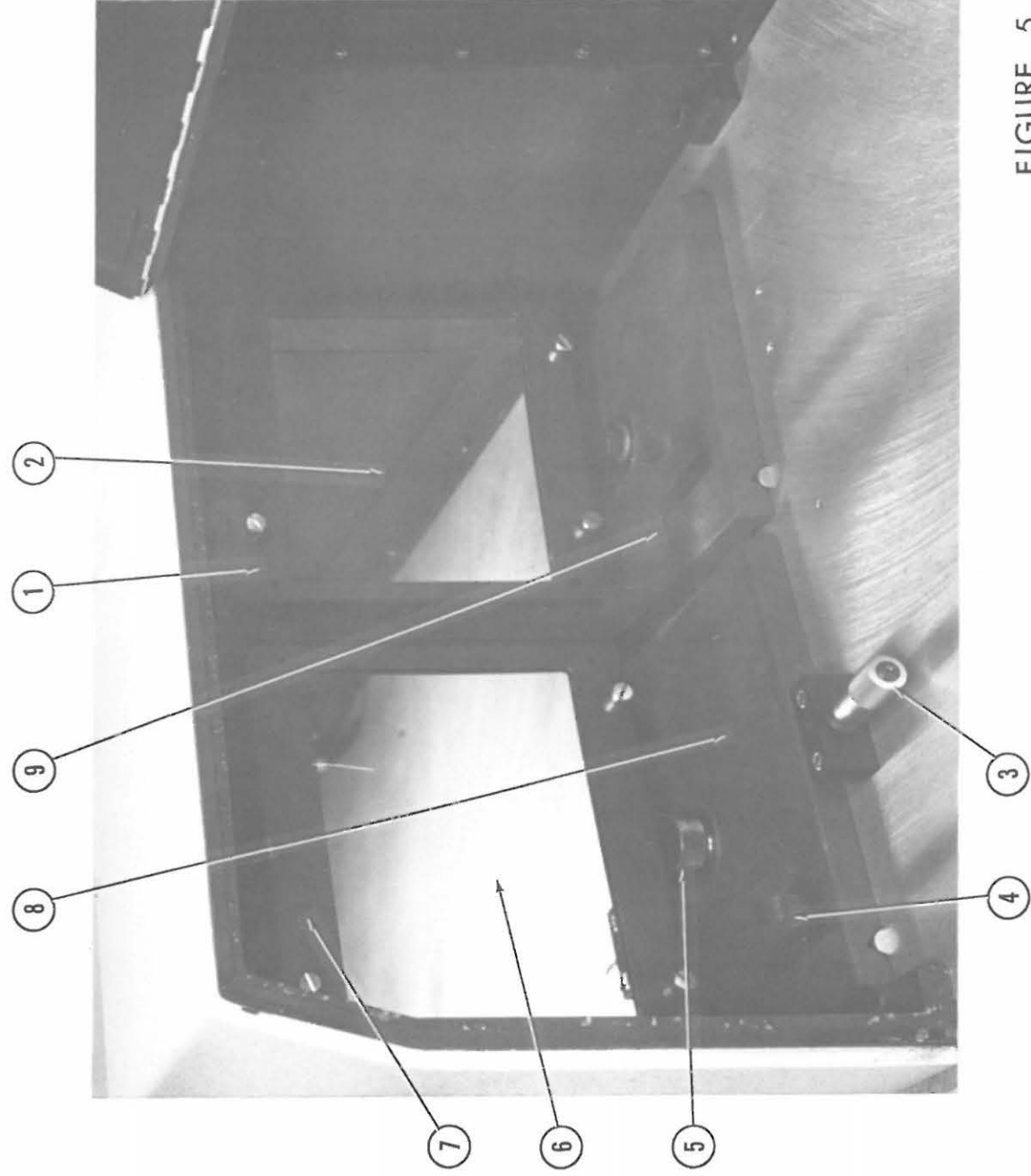
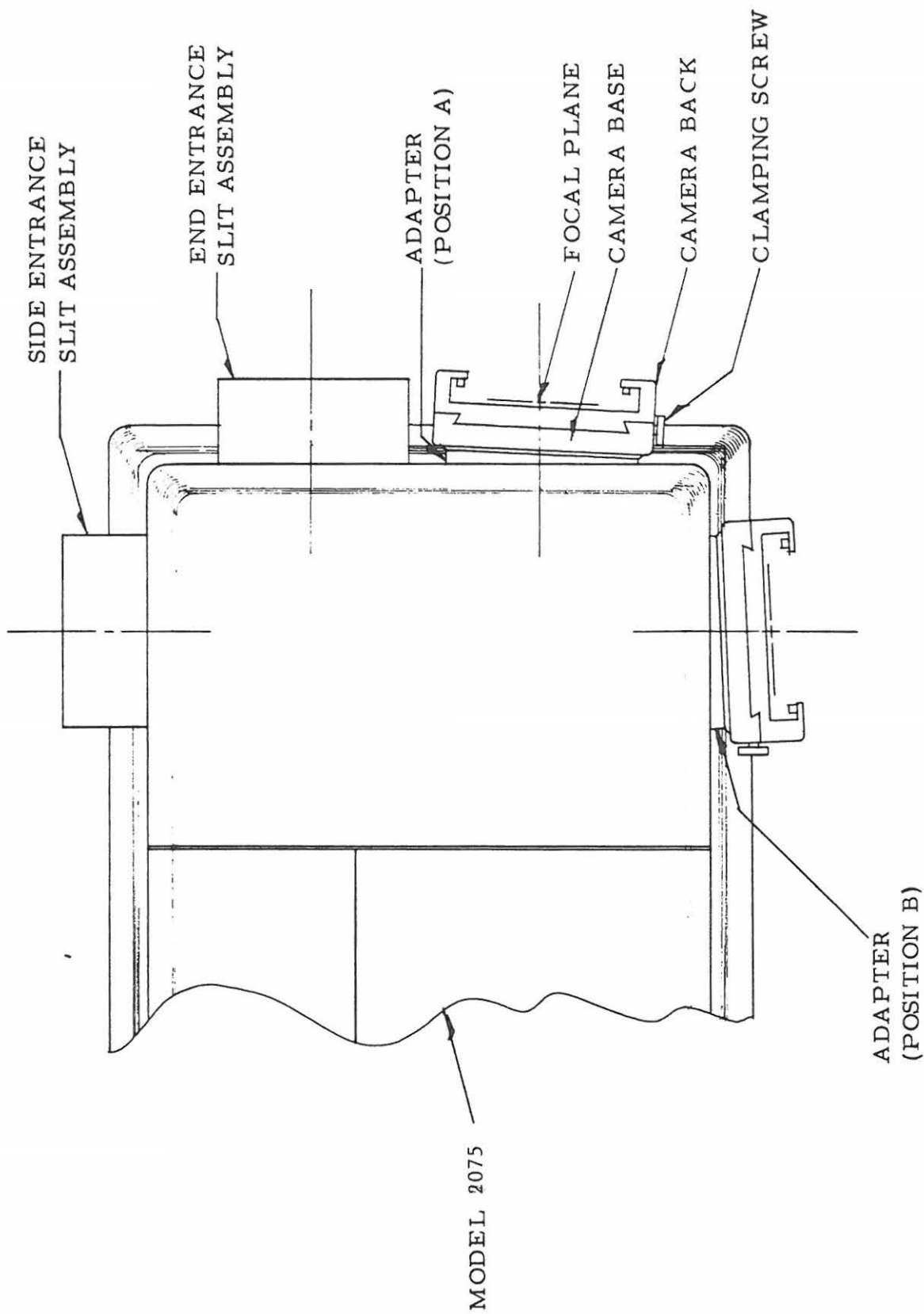


FIGURE 5

- 5.1 Mirror Mask
- 5.2 Collimating Mirror
- 5.3 Focusing Mirror Micrometer
- 5.4 Adjusting Handle
- 5.5 Torque Screw
- 5.6 Focusing Mirror
- 5.7 Mirror Mask
- 5.8 Focusing Mirror Assembly
- 5.9 Collimating Mirror Assembly



CAMERA ATTACHMENT  
MODEL 2075 -E

FIGURE 6

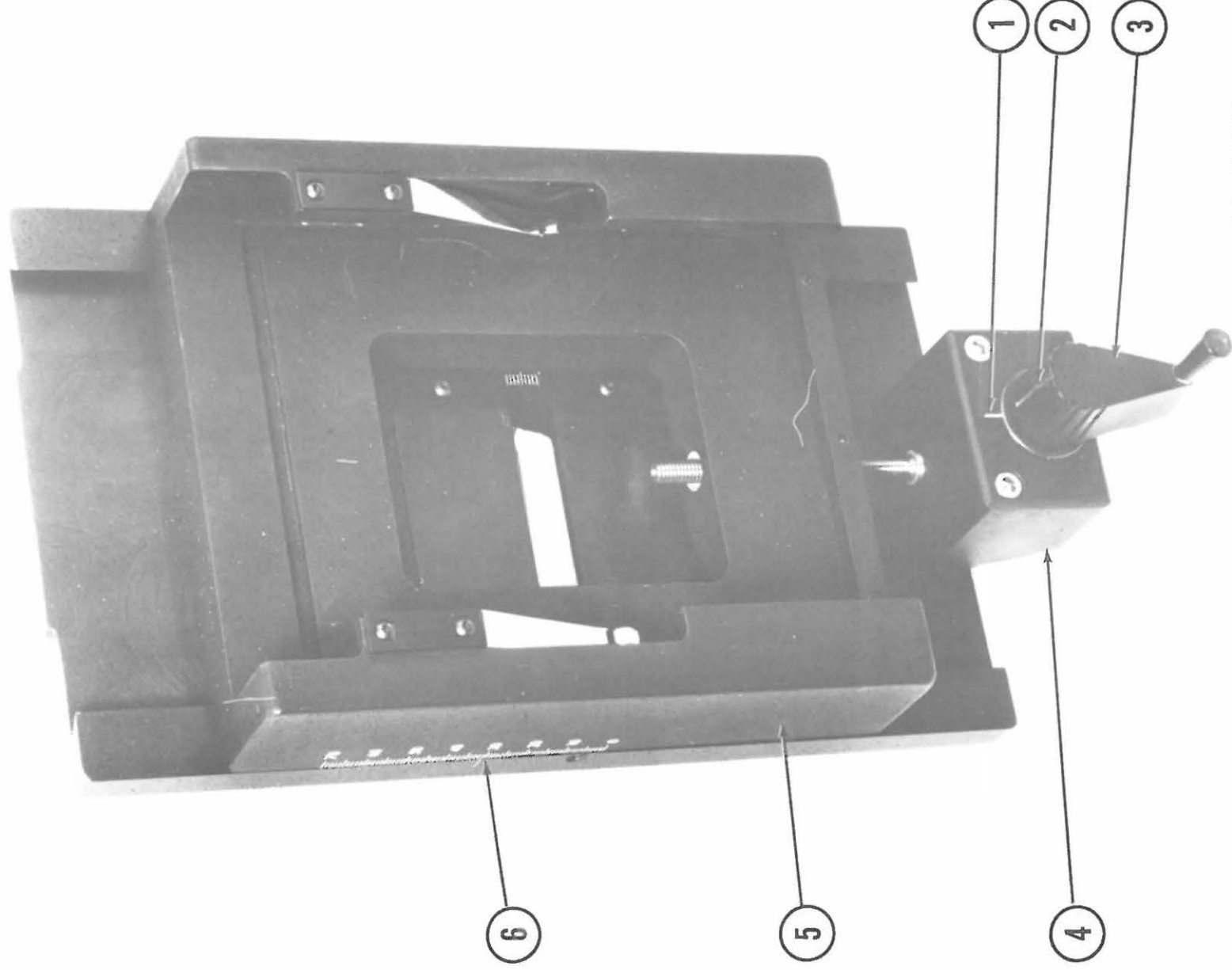


FIGURE 7

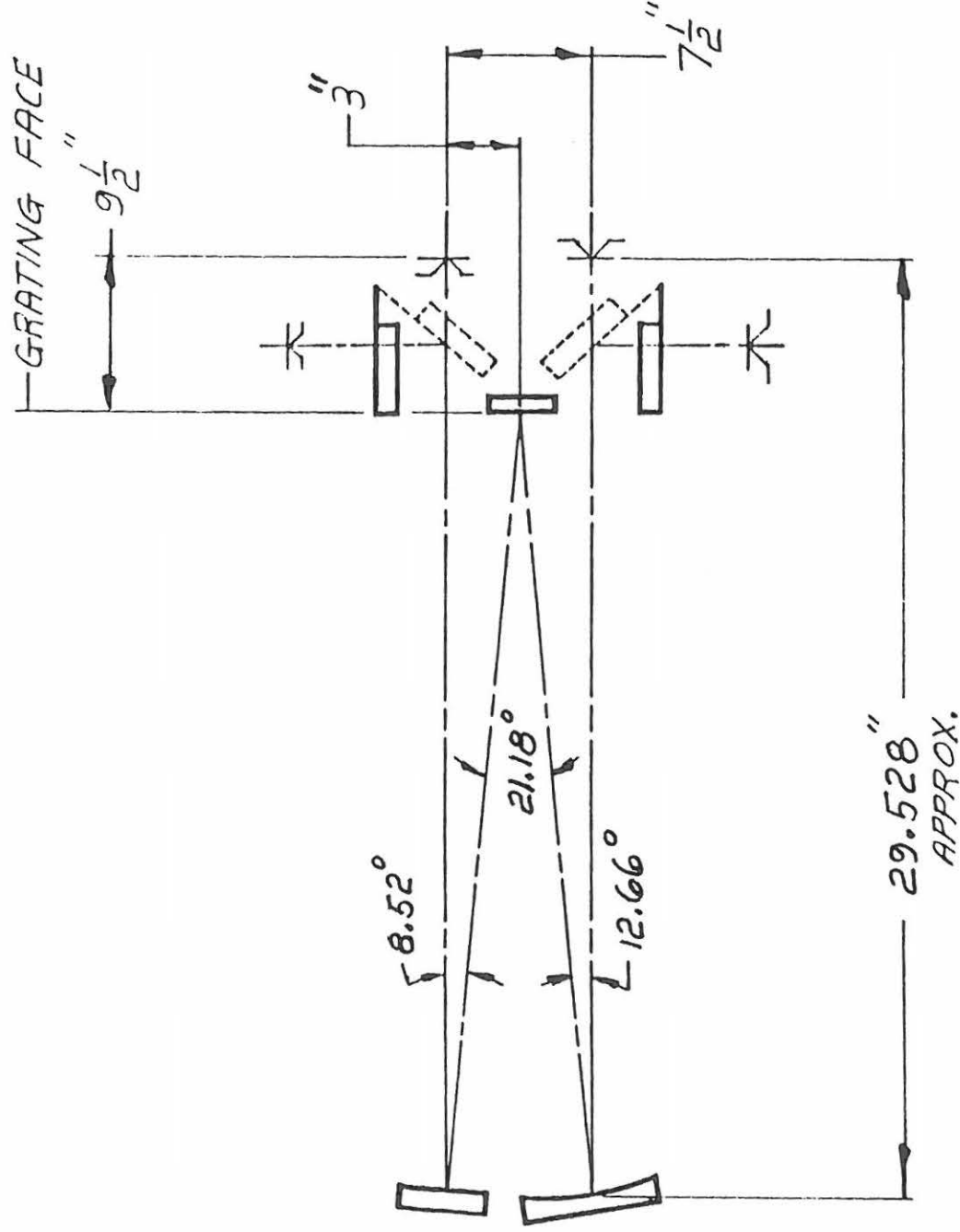
- 7.1 Drive Block Fiducial Mark (Optional)
- 7.2 Knob Fiducial Mark (Optional)
- 7.3 Knob (Optional)
- 7.4 Drive Block (Optional)
- 7.5 Camera Back
- 7.6 Scale



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	ZONE	LTR.	DESCRIPTION
		A	UPDATE SEE RECORD PRINT
		DATE	APPROVED
			G/8/84
MONOCHROMATOR CONNECTOR			
CONTROLLER AUX. CONNECTOR			
MOTOR DRIVER CONNECTOR			
STEPPING MOTOR			
UPPER LIMIT			
LOWER LIMIT			
JUMPER			
McPHERSON INSTRUMENT			
530 MAIN STREET, ACTON, MASSACHUSETTS, 01720, TEL. 617-263-7733			
DWG. TITLE			
MODEL 788 MONOCHROMATOR 2061M1			
WIRING SCHEMATIC (2061M1, 207202)			
SIZE A			
DWG. NO. 3838			
REV A			
SCALE			
CODE			
SHEET			
DO NOT SCALE DWG.			

UNLESS OTHERWISE SPECIFIED	MODEL NO. 788
DIMENSIONS ARE IN INCHES	PART NO.
TOLERANCES ON:	DRAWN JMD 2/9/83
FRACTIONS DECIMALS ANGLES	CHECKED
±1/64 XX ± .010 ±15 MIN	ENGINEER
XXX ± .005	PROJ. ENG
SURFACE QUALITY 60V MAX	ENG. MGR.
REMOVE ALL BURRS & BREAK SHARP EDGES .010 MAX R	
NEXT ASSY.	
MATERIAL:	
FINISH:	

OPTICAL SCHEMATIC  
MODEL 2075  
DUAL TURRET ONLY





"Snap-In" \* GRATING INFORMATION  
McPherson Instrument Corporation

Grooves/mm	<u>1200</u>	
Ruled Area	<u>102 mm</u>	<u>Ruled Width</u>
	<u>102 mm</u>	<u>Groove Length</u>
Blank Size	<u>110 mm</u>	<u>Diameter or Length</u>
	<u>110 mm</u>	<u>Width</u>
	<u>16 mm</u>	<u>Thickness</u>
Blank Material	<u>BSC2</u>	
Blaze Wavelength	<u>4000A</u>	
Blaze Angle	<u>13° 53'</u>	
Efficiency (Minimum)	<u>80 % at 3600A</u>	
	<u>77 % at 4000A</u>	
	<u>70 % at 4500A</u>	
Resolving Power	<u>90 % of theoretical</u>	
Intensity of First Ghost	<u>0.137 % of parent in the</u>	
	<u>1st order of 5461A</u>	
Catalog No.	<u>8358-0066-0</u>	
Serial No.	<u>5445</u>	
Special Coating	<u>Alum</u>	

Remarks: The cosmetic conditions do not adversely affect the  
performance of this grating.

Inspector: *A. B. Bingham*

\* U. S. Patent No. 3,433,557

\* U. S. Patent No. 3,433,557



"Snap-In" \* GRATING INFORMATION  
McPherson Instrument Corporation

Grooves/mm	600	
Ruled Area	102 mm	Ruled Width
	102 mm	Groove Length
Blank Size	110 mm	Diameter or Length
	110 mm	Width
	16 mm	Thickness
Blank Material	BSC2	
Blaze Wavelength	4000A	
Blaze Angle	7°	
Efficiency (Minimum)	84 % at 3900A	
	84 % at 4000A	
	84 % at 4100A	
Resolving Power	>85 % of theoretical	
Intensity of First Ghost	not % of parent in the	
	measurable order of 5461A	
Catalog No.	8358-0032-0	
Serial No.	5447	
Special Coating	Alum	
Remarks:		
Inspector:	<i>Al Bender</i>	

"Snap-In" \* GRATING INFORMATION  
McPherson Instrument Corporation

Grooves/mm	<u>600</u>	
Ruled Area	<u>102 mm</u>	<u>Ruled Width</u>
	<u>102 mm</u>	<u>Groove Length</u>
Blank Size	<u>110 mm</u>	<u>Diameter or Length</u>
	<u>110 mm</u>	<u>Width</u>
	<u>16 mm</u>	<u>Thickness</u>
Blank Material	<u>BSC2</u>	
Blaze Wavelength	<u>7500A</u>	
Blaze Angle	<u>13°</u>	
Efficiency (Minimum)	<u>73 % at 7250A</u>	
	<u>76 % at 7500A</u>	
	<u>75 % at 7750A</u>	
Resolving Power	<u>+80 % of theoretical</u>	
Intensity of First Ghost	<u>0.01 % of parent in the</u>	
	<u>1st order of 5461A</u>	
Catalog No.	<u>8358-0034-0</u>	
Serial No.	<u>5448</u>	
Special Coating	<u>Alum</u>	

Remarks: The cosmetic conditions do not adversely affect the  
performance of this grating.

Inspector: *Al Butler*

\* U. S. Patent No. 3,433,557

"Snap-In" \* GRATING INFORMATION  
McPherson Instrument Corporation

Grooves/mm	<u>300</u>	
Ruled Area	<u>102 mm</u>	<u>Ruled Width</u>
	<u>102 mm</u>	<u>Groove Length</u>
Blank Size	<u>110 mm</u>	<u>Diameter or Length</u>
	<u>110 mm</u>	<u>Width</u>
	<u>16 mm</u>	<u>Thickness</u>
Blank Material	<u>BSC2</u>	
Blaze Wavelength	<u>7620A</u>	
Blaze Angle	<u>6.5°</u>	
Efficiency (Minimum)	<u>86 % at 7000A</u>	
	<u>82 % at 7600A</u>	
	<u>80 % at 8000A</u>	
Resolving Power	<u>&gt;85 % of theoretical</u>	
Intensity of First Ghost	<u>0.026 % of parent in the</u>	
	<u>1st order of 5461A</u>	
Catalog No.	<u>8358-0024-0</u>	
Serial No.	<u>5449</u>	
Special Coating	<u>Alum</u>	

Remarks: The cosmetic conditions do not adversely affect the  
performance of this grating.

Inspector: 

"Snap-In" \* GRATING INFORMATION  
McPherson Instrument Corporation

Grooves/mm	150	
Ruled Area	102 mm	Ruled Width
	102 mm	Groove Length
Blank Size	110 mm	Diameter or Length
	110 mm	Width
	16 mm	Thickness
Blank Material	BSC2	
Blaze Wavelength	8000A	
Blaze Angle	3° 26'	
Efficiency (Minimum)	82 % at 7500A	
	78 % at 8000A	
	70 % at 9000A	
Resolving Power	+85 % of theoretical	
Intensity of First Ghost	0.0009 % of parent in the	
	1st order of 5461A	
Catalog No.	8358-0073-0	
Serial No.	5450	
Special Coating	Alum	

Remarks: The cosmetic conditions do not adversely affect the

performance of this grating.

Inspector: Al Brader

\* U. S. Patent No. 3,433,557

HOLOGRAPHIC  
"Snap-In" + GRATING INFORMATION  
McPherson Instrument

Grooves/mm	<u>1800</u>	
Ruled Area	<u>102 mm</u>	<u>Ruled Width</u>
	<u>102 mm</u>	<u>Groove Length</u>
Blank Size	<u>110 mm</u>	<u>Diameter or Length</u>
	<u>110 mm</u>	<u>Width</u>
	<u>16 mm</u>	<u>Thickness</u>
Range of Optimum Efficiency	<u>7500A</u>	
Efficiency	<u>% at</u>	
	<u>% at</u>	
	<u>% at</u>	
Ghost %		
Catalog No.	<u>8358-0052-0</u>	
Serial No.	<u>5458</u>	
Special Coating	<u>Alum</u>	

Remarks: Blemishes within the ruled area (including the  
mottled holographic speckle pattern) which do not affect  
grating performance in any way are not considered defects.

Inspector: *Alanda*

\* U.S. Patent No. 3,433,557

## **CERTIFICATION**

**S.L. McPherson** certifies that its products are thoroughly tested and inspected and meet specifications published as furnished by the company when shipped from the factory.

## **WARRANTY AND ASSISTANCE**

**McPherson** products are warranted to be at date of delivery free from defects in material and workmanship and conform to the specifications furnished by the company. The company's obligation under this warranty is limited to servicing or adjusting an instrument returned to the factory, prepaid, and to repairing or replacing at the factory any part or parts thereof. All items manufactured by **McPherson** carry a warranty of one year on the above terms. All purchased items carry the original manufacturer's guarantee.

**McPherson** shall not be liable for consequential damages resulting from accidents, alterations, misuse, improper installation, improper training, improper qualified personnel, operation on low or excessive voltages, or any use in violation of the operating instructions furnished by the company.

If any defect appears upon receipt, the purchaser shall promptly notify the company. No material will be accepted for repair or replacement without prior authorization from the company. Upon such authorization and in accordance with instructions of the company, parts, materials or equipment for which repair or replacement is requested shall be returned to the company for examination, with shipping charges prepaid by the purchaser. Final determination as to whether a product or part is actually defective rests with the company.

An estimate of repair charges will be submitted to the purchaser before servicing the equipment.

The company reserves the right to make changes or improvements upon its products without imposing any obligations upon itself to install the same upon its products previously manufactured.

This warranty is in lieu of all other obligations or liabilities expressed or declared on the part of the company, and the company neither assumes, nor authorizes any other person to assume for them, other obligations or liability in connection with the sale of equipment manufactured by **McPherson**.